

WHAT IS CLAIMED IS:

1. A filtering method, comprising:
  - dividing filter coefficients of a filter into a plurality of partial portions as coefficients of a corresponding plurality of partial filters;
  - filtering image data with the plurality of partial filters to generate partial filtered results; and
  - generating complete filter outputs by combining the partial filtered results.
2. The method of claim 1, further comprising:
  - zero padding the filter coefficients before division into the plurality of partial portions if a span  $N$  of the filter is odd; and
  - dividing zero padded filter coefficients into the plurality of partial portions as coefficients of the plurality of partial filters.
3. The method of claim 1, further comprising:
  - permitting  $k^d$  image data pixels used to generate first partial filtered results to be deleted before generating a next consecutive second partial filtered results without preventing generating the complete filter outputs, where  $k^d:1$  is a sub-sampling ratio and  $d$  is a dimension of the filter.
4. The method of claim 3, further comprising:
  - setting  $d$  to 2 and  $k$  to  $N/2$  where  $N$  is a span of the filter, a number of image data pixels permitted to be deleted between generating consecutive partial filtered results being  $(N/2)^2$ .
5. The method of claim 1, further comprising:
  - generating normalized complete filter results by dividing the complete filter results by a sum of the filter coefficients.
6. The method of claim 5, further comprising:
  - approximating the sum of the filter coefficients by a fraction having a power of 2 denominator;
  - multiplying each of the complete filter results by a numerator of the fraction to generate a product; and

right shifting the product by an exponent of the power of 2 denominator to normalize each of the complete filter results.

7. The method of claim 5, further comprising:  
rounding the normalized complete filter results by adding to each of the complete filter results a value equal to half of the sum of the filter coefficients.
8. The method of claim 1, further comprising:  
setting the filter coefficients to have a sum equal to a power of 2; and  
normalizing the complete filter results by right shifting each of its pixels by a number of bits equal to an exponent of the power of 2.
9. A computer readable medium or a modulated signal being encoded to perform the method of claim 1.
10. A filter apparatus, comprising:  
a memory storing a set of filter coefficients of a filter;  
a plurality of partial filters coupled to the memory, each of the partial filters corresponding to a portion of the filter coefficients, the partial filters filtering image data to generate partial filtered results; and  
a filter output generator combining the partial filtered results to generate complete filter outputs.
11. The filter apparatus of claim 10, further comprising:  
a zero padding device that pads the set of filter coefficients with zeros to convert a span  $N$  of the filter to an even value if  $N$  is odd.
12. The filter apparatus of claim 1, further comprising:  
a memory manager coupled to the memory, the memory manager deleting  $k^d$  image pixels from the memory after each set of partial filtered results are generated, where  $k^d$  is a sub-sampling ratio and  $d$  is a dimension of the filter.
13. The filter apparatus of claim 1, further comprising:  
a complete filter outputs normalizer that normalizes the complete filter outputs by dividing each of the complete filter outputs by a sum of the set of coefficients, the normalizer right shifting each of the complete filter outputs by an exponent of a first power of 2 if the sum of the set of coefficients is the first power of 2, or multiplying each

of the complete filter outputs by an integer and right shifting by an exponent of a second power of 2 if the sum of the set of coefficients is not a power of 2.

14. The filter apparatus of claim 13, further comprising:

a rounding device that rounds the normalized complete filter outputs prior to normalizing each of the complete filter outputs by adding to each of the complete filter outputs a value that equals to half of the sum of the set of coefficients.

15. A filter apparatus, comprising:

means for dividing filter coefficients of a filter into a plurality of partial portions;

means for zero padding the filter coefficients before dividing into the plurality of partial portions if a span N of the filter is odd;

means for partial filtering image data to generate partial filtered results based on the partial portions of the filter coefficients; and

means for combining the partial filtered results to generate complete filter outputs.

16. The filter apparatus of claim 15, further comprising:

means for deleting  $k^d$  image data pixels after the means for partial filtering generates the partial filtered results, where  $k^d:1$  is a sub-sampling ratio and d is a dimension of the filter;

means for normalizing the complete filter outputs; and

means for rounding normalized complete filter outputs.

17. A xerographic marking device using the method of claim 1.

18. A digital photocopier using the method of claim 1.